

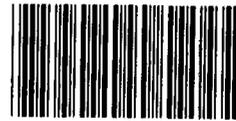
GAO

Report to the Chairman, Subcommittee on
Readiness, Committee on Armed Services
House of Representatives

April 1992

OPERATION DESERT
STORM

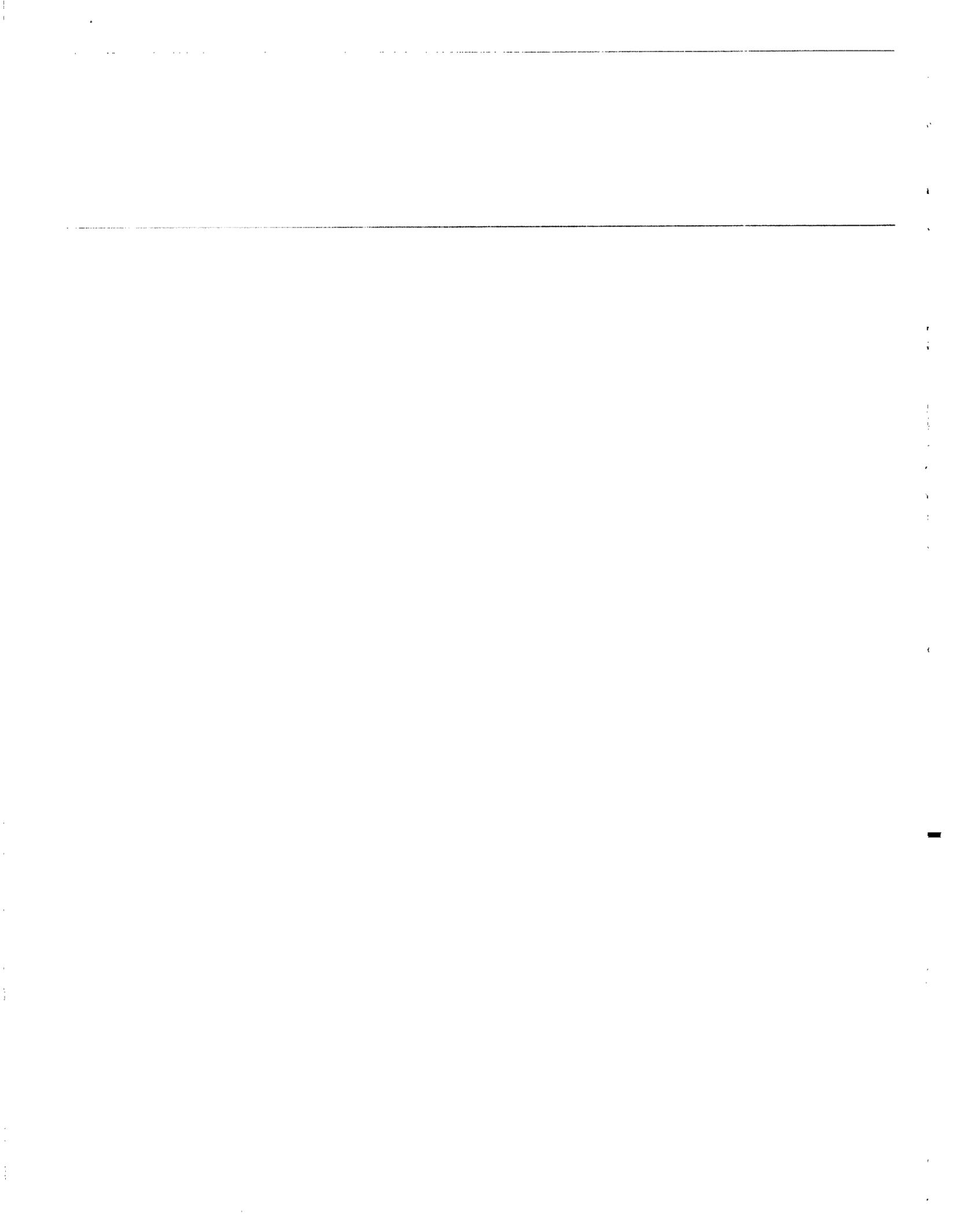
DOD Met Need for
Chemical Suits and
Masks, but Longer
Term Actions Needed



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United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

B-247350

April 7, 1992

The Honorable Earl Hutto
Chairman, Subcommittee on Readiness
Committee on Armed Services
House of Representatives

Dear Mr. Chairman:

In response to your request, we have reviewed the Defense Department's efforts to provide an adequate supply of top quality chemical protective suits, masks, and mask filters for U.S. soldiers that served in Operation Desert Shield and Storm. You indicated concern about whether U.S. forces were equipped to carry out their assigned missions if they had to perform them in a chemical environment.

Unless you publicly announce its contents earlier, we plan no further distribution of this report for 30 days. At that time, we will send copies to the Chairmen of the House and Senate Committees on Armed Services and on Appropriations, the Senate Committee on Governmental Affairs, and the House Committee on Government Operations; the Secretaries of Defense and the Army; and the Director of the Office of Management and Budget. We will also make copies available to others upon request.

Please contact me at (202) 275-4141 if you or your staff have any questions. Major contributors to this report are listed in appendix I.

Sincerely yours,

Richard Davis
Director, Army Issues

Executive Summary

Purpose

The U. S. chemical defensive capability has become increasingly critical with the proliferation of chemical weapons worldwide. The threat of chemical warfare in the Persian Gulf, combined with previously reported technical and production problems with chemical protective suits and masks, focused congressional attention on the chemical defense readiness of the U.S. armed forces in the Persian Gulf.

The Chairman of the Subcommittee on Readiness, House Committee on Armed Services, asked GAO to determine whether there were adequate supplies of chemical protective suits, masks, and mask filters for the Persian Gulf conflict. GAO was also asked to determine whether DOD is effectively managing the acquisition and distribution of the individual chemical equipment.

Background

In the past 6 years, problems with chemical protective suits and masks have been the subject of several GAO reports and congressional testimony. For example, a 1991 GAO report and testimony detailed how shortages and limitations in certain equipment, including chemical suits and masks, continued to affect the U.S. chemical defensive capability.

In 1985, DOD appointed the Army as the executive agency responsible for coordinating the military services' chemical warfare programs and chemical research, development, and acquisition programs.

Results in Brief

Although U.S. armed forces in the Persian Gulf did not experience shortages of chemical protective suits, masks, or mask filters, DOD was not adequately prepared for chemical warfare. Chemical equipment in theater reserves and prepositioned stocks have been below authorized levels for several years.

Many troops were issued older model suits and masks that provided adequate protection but lacked benefits found in newer models. DOD estimates indicate that had the conflict lasted longer and had chemical weapons been used, worldwide suit stockpiles could have been reduced to a point whereby U.S. forces in other areas would have been placed at greater risk.

To prevent potential shortages of critical chemical items during the Gulf conflict, DOD took the following actions:

- Established a new organization to identify worldwide stockpiles of chemical equipment and transferred these supplies as necessary to the Persian Gulf.
- Purchased additional suits.
- Stepped up efforts to rebuild older masks.
- Awarded contracts for mask filters.

Chemical suit shortages and chemical mask fielding problems are long-standing. The Gulf conflict underscores the problems that DOD has had in finding enough manufacturers capable and willing to produce suits at a price it is willing to pay and ensuring that the manufacturers of both suits and masks meet scheduled delivery dates. DOD has partially addressed its suit and mask problems; however, a more comprehensive approach is needed.

Principal Findings

Suit and Mask Supplies Were Adequate for the Persian Gulf Conflict, but the Shifting of Supplies Reduced Readiness Elsewhere

At the outset of the conflict, DOD was not aware of the military services' stocks of chemical equipment. To solve this problem, it established the Joint Service Coordination Committee and the Chemical Division, Office of the Army Deputy Chief of Staff for Logistics, as its action arm. The Committee was responsible for ensuring that the deployed forces received the chemical equipment needed. The Chemical Division, after determining the amount and location of chemical equipment, directed the movement of the equipment worldwide to meet the demand for the Persian Gulf conflict. This further reduced already deficient worldwide stocks of chemical equipment.

Approximately 20 percent of U.S. forces in the Gulf were issued the Chemical Protective Overgarment, an older model chemical suit that offers a lesser protection level against chemical agents, and for a shorter time period than the newer model suit. Similarly, almost all troops were required to wear older style M17 and M25 masks because of the limited quantities available of the newer masks. While the protection requirements of the old and new masks are similar, the newer model offers a number of advantages, including better fit and ease of communicating while wearing the mask.

The Defense Personnel Support Center (a supply support activity of the Defense Logistics Agency that buys chemical protective suits for the

military services) and the Marine Corps took separate actions to minimize potential shortages of chemical protective suits. The Center awarded emergency contracts for the newer chemical suit. Similarly, the Marine Corps, because of concern over an inadequate supply of Army chemical suits, independently purchased 208,915 lightweight suits for use in the Persian Gulf conflict. Some of these suits were purchased from a foreign manufacturer.

The Army stepped up efforts to rebuild existing masks at its facility in Pine Bluff, Arkansas, and established another rebuild center in Saudi Arabia. The Pine Bluff facility increased its capacity rate to rework approximately 5,000 M17s per week during the conflict, compared to 1,100 M17s per week before the conflict. The Army also contracted with two manufacturers to produce additional quantities of M17 and M25 mask filters.

Solving Long-standing Chemical Suit and Mask Problems Will Require DOD's Commitment to Long-term Initiatives

Shortages of chemical suits and problems in fielding masks have existed for several years. Since fiscal year 1988, unfilled requisitions have ranged from approximately one to four million suits. Prepositioned war reserves for chemical suits have been deficient for at least the past 5 years. These long-standing shortages are the result of several factors, including the Defense Personnel Support Center's inability to find manufacturers capable and willing to produce suits at a price it is willing to pay and the failure of manufacturers to meet delivery schedules.

The manufacturers who do agree to provide suits often fail to meet delivery schedules due to the special technical problems inherent in their production. To reduce the number of such failures, Center officials plan to change the procurement method from awarding contracts to the lowest bidder to awarding them instead to the "best value" bidder.

Similarly, mask manufacturers' inability to meet scheduled delivery dates has delayed the fielding of M40 and M42 masks to U.S. troops. The original M40/M42 mask contractor was terminated for default in January 1990 after almost 2 years of poor quality products and schedule slippages. During these 2 years, the contractor delivered only a little over 1 percent of the masks specified under the contract. The termination for default decision was later reclassified to termination for the convenience of the government. The two current manufacturers have had similar problems. Indeed, they had delivered no masks as of August 1990, the start of the Persian Gulf conflict, although deliveries were scheduled to begin in September 1989.

Actions Underway

DOD is taking steps to address its problems with chemical protective suits, masks, and mask filters. For example, it has given the Joint Service Coordination Committee a permanent role in managing chemical protective equipment. Plans are underway to make the Chemical Division a permanent office as well. According to DOD officials, in October 1991, the Army Concepts Analysis Agency began a study to recalculate war reserve requirements for chemical defense equipment, which are currently limited and dated. Pending approval by the Joint Staff, the Joint Service Coordination Committee plans to contract with the Institute for Defense Analysis to perform a parallel study.

Recommendations

Planning a revalidation of war reserve requirements is a necessary first step. However, without the development and implementation of a structured approach to correct its serious suit and mask problems within an established time frame, including strategies for developing the necessary contractor base, DOD is likely to again find itself facing the same potential shortages it faced in the Persian Gulf. Stopgap solutions sufficed once, but there is no guarantee that they will work again—especially should the next conflict be a lengthy one, or involve the use of chemical weapons.

Therefore, GAO recommends that the Secretary of Defense direct the Secretary of the Army, in cooperation with the Director of the Defense Logistics Agency, to develop and implement a long-range action plan with target dates to ensure that required chemical defense equipment is available for all military personnel when needed. At a minimum, the plan should reassess (1) the quantities, characteristics, and capabilities for all chemical protective suits and masks (and other chemical defense equipment, as appropriate) to meet both peacetime and wartime needs, taking into account the changing threat emphasis and shrinking military force, (2) the industrial base needed to meet these requirements and the steps to develop this industrial base, and (3) procurement methods or procedures to ensure the selection of quality producers.

Agency Comments

As requested, GAO did not obtain official agency comments on this report. However, it discussed information obtained during the review with agency officials and included their views where appropriate.

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Abbreviations

DOD Department of Defense
GAO General Accounting Office

Introduction

The ability of U.S. forces to protect themselves against the use of chemical weapons has become increasingly critical due to the proliferation of chemical weapons worldwide. The Department of Defense (DOD) estimates about 20 countries have or are trying to acquire chemical weapons, which are relatively inexpensive and easy to produce yet capable of mass destruction. Many of these countries are in the Middle East, where the United States has a vital strategic interest. Some countries, such as Iraq and Iran, have recently proven a willingness to use chemical weapons.

U.S. chemical warfare deterrence has historically been based on having both retaliatory and strong defensive capabilities. The U.S. chemical retaliatory capability will be reduced as the completion of bilateral and multilateral chemical arms control agreements occur. The United States and the former Soviet Union signed an agreement on June 1, 1990, to dispose of the majority of their chemical weapons stockpiles by the year 2002. The U.S. policy of "no first use" of chemical weapons in a conflict makes a strong chemical defensive capability more crucial for protecting the U.S. military.

According to DOD officials, DOD's policy is that military forces be prepared to survive and carry out their missions in a chemically contaminated environment. Soldiers must be provided with effective equipment to protect against chemical attack.

Organizational Responsibilities

The Assistant to the Secretary of Defense (Atomic Energy) is DOD's focal point for integrated management of chemical matters. The Army serves as the executive agency responsible for coordinating the military services' chemical research, development, and acquisition programs. The Army's Chemical Research, Development, and Engineering Center and the Natick Research, Development, and Engineering Center research and develop the services' chemical equipment.

The Defense Personnel Support Center, a supply support activity of the Defense Logistics Agency, buys chemical protective suits for the military services. The Armament, Munitions, and Chemical Command, a support activity of the Army Materiel Command, buys Army chemical protective masks and mask filters for the military services.

Chemical Protective Suits and Masks

Chemical protective suits and masks are used to protect individuals in a nuclear, biological, and chemical environment. Chemical protective suits protect the body from chemical agents and are effective for a period of time after which they must be replaced. Masks, which allow respiration in a contaminated environment, can often be repaired and reused. Masks are composed of rubber face blanks and replaceable parts, such as eye lenses and mask filters. Mask filters, critical components to breathing uncontaminated air, must be replaced at specified intervals.

While the various military services have 9 different protective suits and 12 different masks, most troops in the Persian Gulf used the Army's standard suits and masks. The Army's two standard chemical protective suits, the Chemical Protective Overgarment and the Battle Dress Overgarment, are designed to be worn in chemically and biologically contaminated environments in both cold and warm climates. The Battle Dress Overgarment, the successor to the Chemical Protective Overgarment, is designed to provide 24 hours of protection against 10 grams per square meter of chemical agent and to retain its effectiveness for up to 22 days in an uncontaminated environment with added risk of chemical casualty for wear up to 30 days. The Chemical Protective Overgarment has a service life of 14 days of continuous wear in an uncontaminated environment. It protects for 6 hours against a concentration of 5 grams per square meter of chemical agent.

Since 1974 DOD has contracted with 19 different firms for 15 million suits valued at \$675.8 million. As of December 1991, the government had active contracts for 2.4 million suits valued at \$186.7 million.

The Army's standard chemical protective masks include the M17, M25, M40, and M42. The M17, which has been used by ground crew personnel and was approved for use in 1959, is the predecessor to the M40 mask. The M25 mask, the predecessor to the M42 mask used by combat vehicle crew members, was approved for use in 1962. According to an item manager at the Armament, Munitions, and Chemical Command, the M17 and M25 masks have been out of production since 1986 and 1988, respectively.

Although the protection requirements of the masks are similar, the M40 and M42 masks provide improved fit and better respiration. They also have a face-mounted canister that can be worn on either side of the mask to accommodate both left-handed and right-handed soldiers. Unlike the M17 and M25 mask filters, the canister filter connection for the M40 and M42 is

North Atlantic Treaty Organization compatible. The newer masks also have provisions for improved radio and telephone communication.

Currently, the Army has two contracts with mask manufacturers to produce 374,501 M40/M42 chemical protective masks at an approximate cost of \$44.5 million. These contracts, which were awarded in 1988, are scheduled to be completed by July and October 1992.

Our Previous Work

In four previous reports and a congressional testimony, we identified problems with the acquisition of chemical protective suits and masks. A 1986 report addresses slipped milestones on chemical masks, shortages of chemical equipment, and the Army's lack of urgency to fund and execute procurement projects.¹ In 1988 we reported that due to development and production delays, the Army had failed to field a mask that satisfied a need that had been identified in 1974.² In 1990 we reported that due to both a shortage of contractors and a long history of contractor failures, the production base would be unable to fulfill the mobilization requirement for chemical suits.³ In 1991 we reported that shortages and limitations in certain equipment, including chemical suits and masks, continued to affect the U.S. chemical defensive capability.⁴

Objectives, Scope, and Methodology

The threat of chemical warfare in the Persian Gulf, combined with previously reported technical and production problems with chemical protective suits and masks, prompted congressional concern with the readiness of U.S. armed forces to survive and continue operations in a chemical environment.

The Chairman of the Subcommittee on Readiness, House Committee on Armed Services, asked us to review whether there were adequate supplies of chemical suits, masks, and mask filters on hand for Operations Desert

¹Chemical Warfare: Progress and Problems in Defensive Capability (GAO/PEMD-86-11, July 1986).

²Army Procurement: Unnecessary Restriction on Competition for New Chemical Protective Masks (GAO/NSIAD-88-66, Mar. 1988).

³Chemical Protective Suits: No Basis to Question Procuring Agency's Acquisition Strategy (GAO/NSIAD-90-162, May 1990).

⁴Chemical Warfare: Soldiers Inadequately Equipped and Trained to Conduct Chemical Operations (GAO/NSIAD-91-197, May 1991) and Chemical Warfare: Soldiers Not Adequately Trained or Equipped to Conduct Operations on a Chemical Battlefield (GAO/T-NSIAD-91-18, Apr. 16, 1991).

Shield and Storm—referred to in this report as the Persian Gulf conflict—and whether DOD is effectively managing the acquisition and distribution of this personal chemical equipment.

Our review focused on (1) the Army suits used predominantly by all services during the Persian Gulf conflict—the Chemical Protective Overgarment and the Battle Dress Overgarment and (2) the M17 and M25 chemical protective masks and the filters for these masks.

To evaluate whether the military had an adequate supply of chemical suits, masks, and mask filters for the Persian Gulf conflict, we interviewed officials from the Army Deputy Chief of Staff for Logistics' Chemical Division about the consumption rates for equipment during the Persian Gulf conflict and contingency plans for equipment shortages. We also reviewed documents on worldwide assets of chemical protective suits, masks, and mask filters. In addition, we interviewed officials from each of the other military services and reviewed their procurement documents to assess their response to potential equipment shortages.

To examine the management control over technical and production problems with the suits and masks, we interviewed DOD officials and reviewed organizational mission statement documents regarding the roles, responsibilities, and future oversight plans of the management organizations involved. We obtained information from the following organizations:

- Assistant to the Secretary of Defense (Atomic Energy);
- Assistant Secretary of the Army for Research, Development and Acquisition;
- Chemical Research, Development, and Engineering Center;
- Army Office of the Deputy Chief of Staff for Logistics, Chemical Division;
- Army Office of the Deputy Chief of Staff for Operations;
- Army Chemical School;
- Defense Logistics Agency;
- Army Materiel Command;
- Defense Personnel Support Center;
- Army Armament, Munitions, and Chemical Command; and
- Pine Bluff Arsenal.

We reviewed contractor files maintained by the Army and the Defense Personnel Support Center to determine the current status of technical and production problems. We also reviewed contracts, briefing documents,

program fact sheets, and memoranda concerning delivery dates to obtain mask production status. In addition, we reviewed documents on the chemical protective mask rebuild programs for the M17 and M25 to determine their availability to support the Persian Gulf conflict.

We conducted our review from November 1990 to December 1991 in accordance with generally accepted government auditing standards.

Suit and Mask Supplies Were Adequate for the Persian Gulf Conflict

U.S. supplies of chemical protective suits, masks, and mask filters were adequate to last the Persian Gulf conflict. However, DOD estimates indicate that already deficient worldwide war reserve stockpiles of chemical protective suits might have been significantly depleted had the war lasted longer and had chemical weapons been used. Furthermore, many troops were issued older model suits, which protect for a shorter time than newer suits, and almost all troops were issued older model masks that lacked many of the benefits of the newer models.

According to DOD officials, in addition to issuing older equipment, actions to prevent potential shortages included (1) establishing a new organization to identify worldwide stockpiles of chemical equipment, including the chemical protective suits and masks, and to transfer this equipment as necessary to the Persian Gulf, (2) purchasing additional suits, (3) stepping up efforts to rebuild older masks, and (4) awarding contracts for mask filters. Some of the actions achieved their intended purpose of increasing the supplies of chemical equipment available to U.S. forces in the Persian Gulf; others did not.

DOD Assessed Equipment Needs and Identified Potential Shortages

DOD determined the amount of chemical equipment required for the Persian Gulf conflict by using a computer model developed by the Institute for Defense Analysis. The model was based on certain assumptions regarding the number of ground forces needing chemical equipment and the expected duration of chemical warfare.

Based on its analysis, DOD determined that it would have enough chemical protective suits, masks, and mask filters if projections regarding the duration of the war and chemical agent use were accurate. In the event of a more extended conflict, however, DOD would have been required to further deplete worldwide stockpiles of chemical protective suits, especially those in Korea and Europe, thus increasing vulnerability in those locations in the event of chemical warfare.

Actions Taken to Guard Against Potential Shortages

Issuing Older Suits and Masks

Due to a shortage of Battle Dress Overgarments in certain locations, Army officials estimate that approximately 20 percent of the U.S. forces in the Persian Gulf conflict were issued the Chemical Protective Overgarment, which, according to a DOD official, protects the wearer for 6 hours versus the 24 hour protection offered by its newer counterpart.

Most troops deployed to the Persian Gulf wore the M17 and M25 masks because the new M40 and M42 masks were generally unavailable for issue, even though fielding was supposed to have started as early as June 1988.¹ While all the masks offer a similar level of protection against chemical agents, the M17 and M25 masks lack a number of advantages provided by the M40 and M42 masks, including better fit and ease of communicating while wearing the mask. These benefits increase the chance of survival and success of the mission.

Establishing a New Organization to Locate and Control Chemical Equipment

In response to an admitted lack of knowledge over the amount and locations of the military services' chemical equipment at the beginning of the Persian Gulf conflict, DOD set up the Joint Service Coordination Committee and the Chemical Division, Office of the Army Deputy Chief of Staff for Logistics, as its action arm. During the Persian Gulf conflict, the Coordination Committee met as often as three times a week to respond to immediate, chemical defense equipment requirements and to ensure that the deployed forces would continue to receive the equipment necessary to meet the threat of chemical warfare.

Since no DOD organization had kept centralized records on chemical equipment before the start of the Persian Gulf conflict, one of the first tasks of the Chemical Division was to determine the amount and location of chemical equipment worldwide, by coordinating with all military organizations. As needs arose, they directed movement of equipment and decided the order in which critical shortages should be filled. The Chemical

¹A small quantity of M40s were issued to "hard to fit" soldiers, which the M17 could not accommodate. The M42s were not available, even on a limited basis.

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Suit and Mask Supplies Were Adequate for
the Persian Gulf Conflict**

Division also recommended the amount of chemical equipment with which each soldier should deploy.

Purchasing Additional Suits

To minimize potential shortages of chemical protective suits, the Defense Personnel Support Center and the Marine Corps awarded emergency suit contracts.

The Defense Personnel Support Center awarded chemical suit contracts in August and September 1990 in anticipation of potential shortages during the Persian Gulf conflict. However, by the end of March 1991, only 25 percent of suits scheduled to be delivered by that date were actually delivered. The Center awarded four contracts in August and September 1990 for 1,050,000 chemical protective suits valued at \$83,890,000. According to Center procurement records, they did not start to receive chemical suits from contractors until January 1991 even though deliveries were scheduled to begin in October 1990. Also, subsequent monthly deliveries were always below the quantities scheduled for delivery. Table 2.1 shows scheduled and actual deliveries on these four contracts.

Table 2.1: Cumulative Deliveries of Chemical Protective Suits

Month	Scheduled	Actual	Percent delivered
October 1990	5,000	0	0
November 1990	39,000	0	0
December 1990	80,000	0	0
January 1991	131,000	7,685	5.9
February 1991	183,000	39,450	21.6
March 1991	241,000	60,918	25.3

Suits were also being delivered under contracts awarded before the Persian Gulf conflict. During the period August 1990 through March 1991, 255,835 suits were delivered under these contracts.

In September 1990, the Marine Corps, citing an inadequate supply of Army chemical suits and also a need for lightweight suits, purchased 208,915 lightweight chemical protective suits (weighted average cost \$168) for the Persian Gulf conflict. Approximately 73,000 were manufactured by a British firm and delivered to the Marine Corps; the other 136,000 were purchased from a U.S. firm. Marine Corps officials considered the lightweight suits to be more appropriate for a desert climate.

Expanding the Mask Rebuild Program

To minimize potential shortages of masks, the Army increased its capacity to service M17s and M25s at the Pine Bluff Arsenal mask rebuild facility in Arkansas. In December 1990, the Army established a mask rebuild facility in Saudi Arabia to avoid the extra time and costs associated with sending masks back to the United States for repair.

At the rebuild facilities, mask defects (such as cracks or leaks) were identified and repaired. Usable parts were pulled and reused from otherwise unrepairable masks. According to a Pine Bluff Arsenal official, approximately 30 to 50 percent of the M17 masks received were unrepairable. The disposal rate depended on the condition of the rubber in the faceblank. Faceblanks with rubber rot, holes, or tears could not be repaired. Repaired masks were returned to the Army supply system for reissue.

During the Persian Gulf conflict, the Army planned to rebuild 5,000 M17s per week at the Pine Bluff facility, compared to 1,100 per week before the conflict.² The build-up was accomplished by increasing staff and overtime hours.

According to a Pine Bluff official, the Pine Bluff Arsenal inspected 93,667 M17s during the Persian Gulf conflict. Table 2.2 shows the number of M17s inspected during each month of the conflict.

Table 2.2: Monthly Rate of M17 Masks Inspected

Month	Quantity
August 1990	6,709
September 1990	14,815
October 1990	15,636
November 1990	12,263
December 1990	14,914
January 1991	21,446
February 1991	7,884
Total	93,667

²Over 95 percent of the M24/M25 masks were retired instead of repaired because of damaged lens. The lens on these masks are permanently glued to the face blank and cannot be repaired.

Although the mask rebuild program helped ensure an adequate supply of M17 masks for the Persian Gulf conflict, the cost of repairing an old mask could almost equal the cost of buying a new mask. For example, it could cost as much as \$120 to rebuild an M17 mask, depending on its condition; in comparison, the contract cost of a new M40 mask is \$125.

Awarding Mask Filter Contracts

The Army contracted to produce mask filters for the M17 and M25 masks; however, deliveries were delayed for at least 3 months due to contractors' technical and production difficulties. One contractor experienced difficulties in reestablishing a production line that had been closed for 2 years; the other contractor had technical problems in assembling a newly configured filter.

Before the Persian Gulf conflict, mask filters for the M17 and M25 masks were not being produced because the masks they supported had been out of production since 1986 and 1988, respectively. After the conflict began, the Army contracted with two manufacturers to produce 641,406 M17 filters and 125,000 M24/M25³ filters with initial delivery scheduled for March 1991 and April 1991, respectively. In addition, a follow-on contract for 775,000 M17 filters was awarded. According to the item manager at the Armament, Munitions, and Chemical Command, the first delivery of M17 filters was received in June 1991 and the other contractor's delivery date was revised to December 1991.

Conclusions

According to information supplied by DOD officials, U.S. troops in the Persian Gulf had adequate supplies of chemical protective suits, masks, and mask filters. However, most troops did have to make do with older model suits, masks, or both, which lacked some advantages of the newer models. DOD had limited knowledge of the whereabouts of chemical defense equipment stockpiles before the outbreak of the Persian Gulf conflict, and DOD's own estimates showed that further depletion of suit stockpiles could have increased worldwide vulnerability had the conflict lasted longer.

³Mask filters for the M24/M25 masks are interchangeable.

Solving Chemical Suit and Mask Problems Will Require Committed Long-term Defense Initiatives

The potential problems with chemical protective suits, masks, and mask filters at the outset of the Persian Gulf conflict was not a short-term problem, but rather the culmination of a long-standing inability by DOD to establish a manufacturing base capable of producing adequate supplies of chemical suits and to develop, procure, and field the M40 and M42 masks. DOD has subsequently taken several steps to give chemical equipment more management attention, such as establishing the Joint Service Coordination Committee and the Chemical Division to address logistical issues. However, management commitment to additional long-term initiatives will be necessary if DOD hopes to resolve the problems that have continually plagued both suits and masks.

Historically DOD Has Not Been Able to Meet Chemical Protective Suit and Mask Requirements

Shortages of chemical protective suits have existed for several years. These long-standing shortages are the result of several factors, including the Defense Personnel Support Center's inability to find manufacturers capable and willing to produce suits at a price it is willing to pay and the manufacturers' failure to meet delivery schedules. Similarly, DOD's efforts to field the M40 and M42 masks have been hindered by contractors' failure to meet scheduled delivery dates.

Shortage of Chemical Suits Is Due to Various Causes

Since fiscal year 1988, backorders¹ for chemical protective suits have ranged from approximately one to four million. According to Defense Personnel Support Center supply personnel, it was not uncommon for an Army unit ordering chemical suits to wait at least 2 years to have its order filled.

DOD has known for some time that in the event of a major military mobilization it would have problems meeting its needs for chemical protective suits. Prepositioned war reserves, which are used during the initial stages of a conflict, have been at least 43 percent deficient for the past 5 years.

One key reason for the shortage of chemical suits is the Defense Personnel Support Center's inability to identify a sufficient number of chemical suit producers. Center planners attempt to identify and enter into industrial preparedness agreements with firms capable and willing to produce suits in the event of a major military mobilization. During fiscal year 1991,

¹Backorders are requisitions that cannot be filled when submitted because stock is not available, but are expected to be filled at a later date.

**Chapter 3
Solving Chemical Suit and Mask Problems
Will Require Committed Long-term Defense
Initiatives**

however, the Center signed agreements with planned producers for 6.6 million suits, or 12 percent of the 12-month mobilization requirement of 55.6 million suits. By contrast, in fiscal year 1990, agreements were signed for 13 percent of the total mobilization requirements.

This problem is compounded by contractors' frequent failure to meet delivery dates due to technical, production, and financial problems stemming from the difficulties of manufacturing chemical suits. Sewing machine needles often break, slowing down production. In addition, charcoal dust, a byproduct of the production process, creates a need for a separate specially ventilated production facility. This dust also creates a high rate of employee turnover, which means contractors must spend significant time and money to train new workers.

The failure of contractors to anticipate these problems often leads to delivery slippages, which may cause financial problems. Underfinanced contractors have to rely heavily on progress payments to pay employee wages, solve production problems, and continue operating. When their delivery schedules slip and progress payments are delayed, the result can be financial failure.

Historically, according to a Center official, there has been a 50-percent failure rate for chemical suit contracts. In turn, such failures mean the loss of required supplies and stock funds. Furthermore, delivery slippages seem to be the rule rather than the exception. Table 3.1 indicates the extent of delivery slippages for contracts active as of December 1991.²

²Active contracts do not include a recently terminated contract, originally for 490,915 suits at \$61 per suit. The government paid the contractor approximately \$4.5 million in progress payments, yet received only 13,350 suits.

**Chapter 3
Solving Chemical Suit and Mask Problems
Will Require Committed Long-term Defense
Initiatives**

**Table 3.1: Delivery Slippages for Active
Suit Contracts**

Month	Scheduled (cumulative)	Actual (cumulative)	Percent delivered
January 1990	27,285	0	0.0
February 1990	54,560	0	0.0
March 1990	81,845	12,591	15.4
April 1990	109,125	12,591	11.5
May 1990	136,405	19,148	14.0
June 1990	163,690	27,367	16.7
July 1990	190,965	36,871	19.3
August 1990	218,250	52,947	24.3
September 1990	245,530	62,883	25.6
October 1990	277,810	86,067	31.0
November 1990	339,095	105,939	31.2
December 1990	407,280	120,195	29.5
January 1991	499,200	173,063	34.7
February 1991	592,115	243,948	41.2
March 1991	691,040	295,396	42.7
April 1991	793,450	400,415	50.5
May 1991	906,625	492,077	54.3
June 1991	1,019,795	562,843	55.2
July 1991	1,134,710	700,245	61.7
August 1991	1,251,635	802,772	64.1
September 1991	1,356,545	934,629	68.9
October 1991	1,452,470	1,068,180	73.5
November 1991	1,558,395	1,195,296	76.7

Due to these extensive slippages, the Center revised delivery schedules numerous times. Even with these revised schedules, as of December 1991, deliveries from four of the seven current contracts had slipped.

In the past, the Center's practice was to award chemical suit contracts to the lowest bidder. All too often such businesses turned out to be inexperienced and underfinanced. When they failed, the Army did not get its suits.

Center officials informed us that, in an attempt to reduce these failures, they intend to change the method of procurement. The new method, called "best value," will evaluate contract bids on factors in addition to low price. Since this new procurement method has not yet been implemented, we do not know how successful it will be.

DOD and agency officials told us that inadequate funding has also hampered their ability to obtain the required number of suits. They did not, however, explain how additional funds would have been used given the problems with the industrial base.

**Failure of Mask
Manufacturers to Meet
Delivery Dates**

Although the M40 and M42 masks were approved for production in June 1987 and delivery was to start the following year, manufacturers' inability to meet delivery schedules has delayed the fielding of these masks to U.S. forces.

The Army first developed its requirement for a new mask in 1974. Development of the M40 began in 1982 when earlier developmental mask programs, the XM29 and XM30, failed to accomplish the desired improvements. The M40 mask design was based on a minimum change/minimum risk engineering development, in part, to help ensure quick fielding. As such, it used proven mask technology and components, including the predecessor mask's binocular hard lens and several successful components from the XM29 and XM30.

The original M40 and M42 mask contractor was terminated for default in January 1990 after almost 2 years of poor quality products and schedule slippages. However, the termination for default was later reclassified to termination for the convenience of the government. The contract initially called for delivery of 300,000 masks, of which the contractor delivered a total of 3,358, or 1.1 percent of the total contract quantity. Similar problems seem to be occurring with the two current M40 and M42 producers. The current contracts were awarded in September 1988 for 120,000 masks each, with deliveries scheduled to begin in September 1989. Because of technical and production problems such as difficulties in developing proper tooling and molding, the contractors still had delivered no masks by August 1990, the start of the Persian Gulf conflict.

After the start of the Persian Gulf conflict, the Army amended its mask production contracts to increase delivery quantities and extend delivery schedules. According to a Chemical Division official, one contractor began to deliver in May 1991 and the other in September 1991. By the end of November 1991 the contractors had delivered 44,435 M40 masks, or 80 percent of the 55,400 masks scheduled for delivery during calendar year 1991. The Army expected that the remaining 10,965 M40 masks would be delivered by the end of December 1991. Table 3.2 shows actual M40 deliveries from May 1991 to November 1991.

**Chapter 3
Solving Chemical Suit and Mask Problems
Will Require Committed Long-term Defense
Initiatives**

**Table 3.2: M40 Chemical Protective
Mask Deliveries**

Month	Quantity delivered
May 1991	200
June 1991	600
July 1991	1,400
August 1991	2,200
September 1991	7,000
October 1991	14,000
November 1991	19,035
Total	44,435

M42 mask deliveries were scheduled to begin in December 1991. By March 1992, each contractor is scheduled to produce 20,000 M40/M42 masks per month until their contracts are completed.

**DOD Has Begun to
Recognize and Deal
With Long-standing
Problems of Suits and
Masks**

DOD has taken steps to control the issue and procurement of chemical suits and masks. Furthermore, it is planning to recalculate how many chemical suits and masks it needs.

Recognizing the need for an organization with authority to manage chemical protective equipment, DOD, in May 1991, made the Joint Service Coordination Committee permanent. It also plans to make the Chemical Division a permanent office.

According to DOD officials, in October 1991, the Army Concepts Analysis Agency began a study to recalculate chemical equipment war reserve stockage needs. The Army recognized that the factors used to estimate its existing reserve requirements were limited and outdated. Some factors dated back to World War I and others were predicated on conflict with the Soviet Union in Europe. They acknowledged that they needed to update these factors because the specific threat emphasis had changed and a wider range of equipment types and characteristics needed to be considered. In June 1991, the Joint Service Coordination Committee requested funding from the Joint Staff to contract with the Institute for Defense Analysis to perform a parallel study. As of December 1991, however, funds had not been approved for the latter study.

Conclusions

DOD's production and technical problems with chemical protective suits and masks are of long-standing. For those manufacturers DOD has contracted with, delivery slippages and contract failures have been the rule rather than the exception. Furthermore, DOD has had a hard time finding capable and willing suit manufacturers. As a result, DOD continues to have on hand and on order less than half of its required prepositioned war reserves for chemical suits, and continues to lag in fielding the new model M40 and M42 masks.

DOD has taken some actions—such as adopting the best value procurement method and setting up the Army's Chemical Division—to address its problems with chemical equipment, including the protective suits and masks. These actions may partially resolve some of the long-standing problems. However, without the development and implementation of a structured approach to correct its serious suit and mask problems within an established time frame, including strategies for developing the necessary contractor base, DOD is likely to again find itself facing the same potential shortages it faced in the Persian Gulf. Stopgap solutions sufficed once, but there is no guarantee that they will work again—especially should the next conflict be a lengthy one, or involve the use of chemical weapons.

Recommendations

We recommend that the Secretary of Defense direct the Secretary of the Army, in cooperation with the Director of the Defense Logistics Agency, to develop and implement a long-range action plan with target dates to ensure that required chemical defense equipment is available for all military personnel when needed. At a minimum, the plan should reassess the quantities, characteristics, and capabilities for all chemical protective suits, masks, and other chemical defense equipment, as appropriate to meet both peacetime and wartime needs, taking into account the changing threat and shrinking force size. The plan should also reassess the industrial base needed to meet these requirements and the steps to develop this industrial base, and procurement methods or procedures to ensure the selection of quality producers.

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